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THE ESTABLISHMENT OF SCHOOL AND COLLEGE ABILITY TEST NORMS FOR BLIND CHILDREN IN GRADES 4, 5, AND 6

A DISSERTATION

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BY

MARGARET ADELLE PEARSON

Norman, Oklahoma

1962

THE ESTABLISHMENT OF SCHOOL AND COLLEGE

ABILITY TEST NORMS FOR BLIND

CHILDREN IN GRADES 4, 5, AND 6

APPROVED BY

DISSERTATION COMMITTEE

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THE ESTABLISHMENT OF SCHOOL AND COLLEGE ABILITY TEST NORMS FOR BLIND CHILDREN IN GRADES 4, 5, AND 6

CHAPTER I

INTRODUCTION

Chronological Review

Only few studies have been completed where selected standardized intelligence tests for sighted children were adapted for use with blind children. The first attempt in the standardization of intelligence tests for the blind was accomplished by Irwin and Goddard at Vineland, New Jersey in 1914.[1] At that time Irwin, who was Supervisor for the Blind in the Cleveland Public Schools became interested in measuring the intelligence of blind children. He went to Vineland to work with Goddard on the question of adapting the Binet-Simon Tests for use with blind children. As a result of this undertaking Goddard used his recent (1911) English translation of the Binet. Tests that required no visual performance were used. Revisions and additions from available tests were arranged by grade levels in accordance with Irwin's personal

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[1]S. P. Hayes, Contribution to a Psychology of Blindness, (New York: American Foundation for the Blind, 1941), pp. 102-103.

opinion of blind children's abilities. A pilot study was then conducted with a population of approximately 45 children, for the purpose of ascertaining whether or not the tests had been placed at the appropriate grade level for use with blind children. Although Irwin realized that some of the tests had been placed at the wrong grade level, Irwin and Goddard were of the opinion that more data must be collected before any test could be changed to another grade level. The tests were printed with the view of testing the tests, not the subjects. Irwin then had the tests, the Irwin-Binet Bettery, put to use by T. H. Haines in the Ohio State School for the Blind. Haines made a recast of the tests from a year scale to an arrangement of the Yerkes Point Scale for use with blind children and published his results with directions in 1916.[2]

By this time Irwin had tested nearly 1,000 blind students in the Pennsylvania School for the Instruction of the Blind (now Overbrook School for the Blind) at Philadelphia, Pennsylvania; Perkins Institute for the Blind at Watertown, Massachusetts; and, New York State School for the Blind at Batavia, New York. These test date were compared statistically with the results of Terman's study in which he tested 1,000 unselected American School children between the ages of five and fourteen, using the Stanford Revision of the Binet Tests. The Irwin-Binet Battery compared favorably with Terman's Revision of the Binet. The distributions of intelligence test scores were the same for both the blind and the seeing; that is, the great mass of pupils tested

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[2]T. H. Haines, "Mental Measurement of the Blind; a provisional point scale and data for a year scale," Psychological Review Monograph, Vol. IIX, No. 1, (1916), pp. 1-89.

approximately at age with a small percentage of mentally superior and mentally inferior pupils. A comparison of the estimates of the mentality of the pupils by the teachers with the above statistical data seemed to indicate that the Irwin-Binet Battery was fairly satisfactory in classifying the intelligence of blind pupils.

Up to 1918, the Irwin-Binet was predominately used for measuring the intelligence of the blind. At that time the Group Point Scale with grade and age norms for 1,000 unselected blind children was published by Pressey and Pressey.[3] This Point Scale contained a series of ten tests which would yield a maximum score of 200. The tests were designed to measure rote memory, logical selection, oral arithmetic, synonyms, logical memory, spelling, morals, the student's ability to rearrange sentences which are in haphazard order into coherent sentnnces, the range of knowledge about every day facts, and analogies. In comparing the results obtained from these tests with blind children and sighted children, the average attainment of the blind children was found to be considerably lower than that of sighted children. This comparison indicated that some of the tests were not suited to the blind, or, that insufficient time was allowed in administering the tests. Directions for giving the Pressey Group Point Scale were published in Hayes's Manual for Self-Surveys in 1921.[4]

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[3]S. L. Pressey and L. W. Pressey, "A Group Point Scale for Measuring General Intelligence," Journal of Applied Psychology, Vol II, (1918), pp. 250-269.

[4]S. P. Hayes, Manual for Self-Surveys in Schools for the Blind, Research Publication No. 2, Pennsylvania Institute for Instruction of the Blind (Philadelphia: Pennsylvania Institute for Instruction of the Blind, (1921).

This seemed to indicate that the Point Scale had become an accepted supplement to individual intelligence test scores.

Hayes recognized that the 1916 revision of the Binet Test was a generally accepted standard method of measuring the intelligence of seeing children. Consequently, in 1923 he prepared the Scissors and Paste Guide, and Irwin assisted Hayes in this preparation. The guide was made by pasting into Terman's Condensed Guide for the Stanford Revision of the Binet-Simon Intelligence Tests, a number of typed slips covering such changes as seemed necessary to adapt the tests for use with the blind. Hayes states:

> The arrangements of tests was based upon a careful, though incomplete, statistical study of passes and failures by age groups, supplemented by the judgment of the psychometrists who had used the tests continuously since 1916.[5]

The Scissors and Paste Guide was widely distributed and served its purpose fairly well, but too little acceptable test material was at hand to provide six tests for each year group. Additional material was needed to make the Scissors and Paste Adaptation similar to the Binet. As a result a study of passes and failures was used as a basis for grouping, and the new test material was grouped by age much closer to Terman's Adaptation of the Simon-Binet Intelligence Tests. An examination of of other test series, such as Knox,[6] Kuhlmann,[7] and Herring[8] yielded a

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[5]Hayes, p. 272.

[6]H. A. Knox, Alien Mental Defectives, (Chicago: C. H. Stoelting Co., 1914).

[7]F. Kuhlmann, Handbook of Mental Tests, (Baltimore: Warwick and York, 1922).

[8]J. P. Herring, Revision of the Binet-Simon Tests, (New York: World Book Co., 1922).

considerable number of items which seemed feasible for use with the blind. With this accumulation of material it was possible to supplement the tests formerly prepared and to have six tests for each year group.

As a consequence of the new complement of tests Hayes felt it was necessary to publish a new manual. In 1930 he published the Condensed Guide, Adapted for Use with the Blind.[9] As a result of the publication of this new guide a minor boom in testing the blind began. A program of testing and re-testing was started in several schools for the blind. It was found that in using the 1930 adaptation over a period of ten years with blind children, the normal distribution of I. Q.'s ranged from 92 - 108. In spite of the fact that the Irwin-Binet, the Scissors and Paste Guide, and the Condensed Guide were used successively it was revealed that there was little change in the average I. Q. of blind pupils during the period from 1915 to 1940. The median I. Q., based on 55 to 85 pupils each year, oscillated from year to year slightly above or below I. Q. 90 as the center. Out of the 2,192 blind pupils tested with the 1930 revision, it was found that the average I. Q. was 98 with a standard deviation of 0.20.[10]

In 1937 statistical results had been completed on the Condensed Guide. The guide was found to be valid and reliable.[11] When the Terman-

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[9]S. P. Hayes, Terman's Condensed Guide, Adapted for Use with the Blind, Research Publication No. 4, Perkins Institution, (Watertown, Massachusetts: Perkins Institution, 1930).

[10]S. P. Hayes, "Measuring the Intelligence of the Blind," Blindness, ed., P. A. Zahl (Princeton: Princeton University Press, 1950), Chap. 10, p. 143.

[11]Hayes, Contribution to a Psychology of Blindness, pp. 274-278.

Merrill Adaptation of the Binet appeared with a standard deviation of 16, Hayes felt that this new series would yield better results than the Condensed Guide in measuring the intelligence of blind children. A selection of tests items from both the L and M forms of Terman and Merrill's revision were made. Only those items that could be administered without the use of vision were selected. For grades seven through adult six tests were utilized for each age group. In order to obtain six tests for each age group in grades three through six, it was necessary to use itmes which had been successful in the Condensed Guide of 1930. This adaptation of Terman and Merrill's revision was called the Interim Hayes-Binet to indicate its tentative character until sufficient data could be collected for a formal standardization.

The Interim Hayes-Binet was used for two years at Perkins Institute with optimum success under the direction of Hayes. The validity and reliability of the Interim Hayes-Binet seemed to be sufficient to justify its recommendation for the measurement of the intelligence of the blind.[12] Hayes stated that this scale should be used with elementary and junior high students since it was based upon a scale developed for that age group. It sampled a variety of mental functions and it was generally found quite interesting to the subjects. Although a manual for administration, scoring, and interpretation of the new Hayes-Binet was available, it should not be used by the untrained person.

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[12]S. P. Hayes, "A Second Test Scale for the Mental Measurement of the Visually Handicapped," Outlook for the Blind, Vol. XXXVII, pp. 37-41.

In the period from 1914 to 1934 considerable attention was given to the development of intelligence tests for blind children. Practically, all effort was centered upon the adaptation of the Binet-Simon Scale and its revisions. Merry and Merry stated that during this twenty year period some of the well-known performance tests were adapted for use with the blind, but they were sporadic attempts and the results were not very satisfactory.[13] However, they concluded that the finger maze seemed particularly well-suited for measuring the learning ability of blind students, since no special adaptation was necessary to compensate for the lack of sight.

Merry and Merry's study of 1934 was one of the best known and most quoted concerning the use of the finger maze as a supplementary individual test of intelligence for blind children. The primary aim of this study was to compare the learning ability of sighted children with the learning ability of blind children, both of whom had taken the Finger Maze Test.

A description of the maze used in Merry and Merry's study follows:

> The high-relief maze which was utilized as a multiple-T pattern, wherein each true path is balanced by a corresponding cul-de-sac and is constructed with wire staples driven into a board about thirteen inches square. The paths are numbered to facilitate the recording of errors, there being ten culs-de-sac and ten true paths. The high relief maze was chosen for the present experiment rather

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[13] R. V. Merry and F. K. Merry, "The Finger Maze as a Supplementary Test of Intelligence for Blind Children," Pedagogical Seminary and Journal of Genetic Psychology, Vol. XLIV, (1934), p. 227.

> than the stylus maze, as the former permits direct finger contact, and has been shown to be equally difficult for both blind and seeing subjects.[14]

From the statistical results presented by Merry and Merry the following conclusions were drawn: (1) that the finger maze was a valuable supplement to the existing intelligence tests for blind children; (2) that no norms of accomplishment could be computed because the population thirty was too small; (3) that the high intercorrelations between trials, errors, and time were satisfactory measures of maze learning ability; (4) that mental age, computed by existing intelligence scales, correlated more closely with maze learning than did chronological age; and, (5) that the motor method of learning characterized the children in this investigation.[15]

Although the maze learning experiment by Merry and Merry proved to be an excellent supplementary test of intelligence, the field of group intelligence testing had not yet evolved. However, much had been acc lished in the area of group achievement testing. Out of this researcn for the blind has grown an adaptation of the Stanford Achievement Tests, Metropolitan Achievement Tests, Myers-Ruck High School Progress Tests, Sones-Harry High School Achievement Test, and Sequential Tests of Educational Progress (STEP). In the field of group intelligence testing,the following tests have been adapted: the Otis Classification Test (1931), Fortner's Adaptation

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[14] Ibid., p. 227.

[15] Ibid., p. 230.

of the Kuhlmann-Anderson Test (1930), and the Pinter General Ability Test (1944).

In accordance with the statistics presented by Hayes, the group intelligence tests that had been adapted for the blind had a fairly satisfactory correlation in comparison with the existing individual mental measurements.[16] He concluded that they were of little value except as a survey of the more general abilities; due to the fact, these correlations were low, these group tests yielded distinctly lower I. Q.'s than did the individual intelligence tests, and the child's ability to read Braille was contingent in obtaining accurate scores.

Authorities in the field of education of the blind suggested that group intelligence tests should be used in schools for the blind only as general surveys of intelligence, and/or as a supplement to the individual intelligence quotient. The primary reason for this opinion was that the only way the blind child's score could be interpreted was through use of norms for sighted students. Since these norms were based on time limits, within which the subject covered as much material as time allowed, and since research showed that it took three times as much time to read Braille as it did to read print, this would be an unfair comparison.[17] Furthermore, research in

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[16]Hayes, "Measuring the Intelligence of the Blind," Table 10, p. 170.

[17]Floyd F. Caldwell, A Comparison of Blind and Seeing Children in Certain Educational Abilities, (New York: American Foundation for the Blind, 1932), p. 1-28.

intelligence testing with sighted children seemed to indicate that group intelligence tests were an adequate basis on which to ascertain the child's scholastic aptitude. Although considerable success had been achieved in educational testing for academic progress of blind children, very little work had been done in testing the intelligence of blind children in a group situation.

Statement of the Problem

The primary purpose of this study was to establish group intelligence norms for blind children in the fourth, fifth, and sixth grades enrolled in state schools for the blind. A subsidiary phase of the study was to compare the mean test scores of the Braille readers and Large-Type readers using an appropriately adapted standardized group intelligence test.

Limitation

The study was limited to fourth, fifth, and sixth grade children who attended the following state schools for the blind: Oklahoma State School for the Blind, Arkansas State School for the Blind, Tennessee State School for the Blind, Kentucky State School for the Blind, Missouri State School for the Blind, Kansas State School for the Blind, and Nebraska State School for the Blind. The scores were obtained from all children in these grades, but only those for white children were used.

Definition of Terms

Terms compiled by instructors for the blind and those used exclusively with the blind are compatible with the terms defined in

Good's Dictionary of Education.[18] Likewise, the terms in this study are similarly used and defined below:

Blind: sightless, or having impaired vision, commonly defined in ophthalmological terms as follows: having central visual acuity of 20/200 or less in the better eye, with correcting glasses; or having a field defect in which the peripheral field is restricted to such an extent that the widest diameter of the visual field subtends an angular distance no greater than 20 degrees. (there is some variation in various states in the definition of blind.)

Braille: a touch system of reading and writing for the blind, adapted from the older system of Barbier by Louis Braille (1809-1852), in which the letters of the alphabet are represented by various combinations of raised dots in a cell two dots wide by three dots high; may be written by hand with a stylus and slate or on a mechanical Braille writer, or may be printed from metal plates.

Braille grade two, standard English: a contracted system of Braille including the alphabet, punctuation marks, and 185 contractions, adopted in 1932 for the English-speaking world by duly authorized representatives of the United States and British Empire. (An uncontracted and a less highly contracted system are known, respectively, as Braille grade 1 and Braille grade 1½; a more highly contracted system is known as Braille grade 3.

Braille Slate: a metal frame for writing Braille by hand; consists of two leaves hinged together, the lower containing lines of indentations in the form of Braille cells, the upper with openings over these cells; Braille dots are impressed by a stylus on heavy paper inserted between the leaves; writing is in reverse to reading.

Braille stylus: an awllike punch for making Braille dots by hand on a Braille slate.

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[18]Carter V. Good, ed., Dictionary of Education, (New York: Mc-Graw-Hill Book Company, 1959).

Cubarithme slate: a frame, used in arithmetic by the blind, containing rows of square cells in which are placed cubes having on their faces Braille letters to represent the digits; since each Braille letter can be placed in different positions, only five letters are needed to represent all the digits.

Large-type book: a book printed on off-white or cream-colored paper in 18- or 24-point type of clear, simple design with as few serifs as possible, produced especially for the education of partially seeing pupils.

Residential school for the blind: a boarding school for blind and some cases also for partially seeing children of school age, having a curriculum similar to that of the public elementary and high schools but employing special teaching methods and equipment.

Sight saving: (sight conservation) a general term for those activities involved in the deliberate effort to conserve and/or improve the eyesight and eye health of individuals or groups, especially as carried on in schools. (When used as an adjectival sense, the term sight saving is preferred to sight conservation.)

Taylor slate: a rigid frame, used in arithmetic by the blind, that has many rows of evenly spaced octagonal holes in which square types having a raised bar on one end and two points on the other are placed in different positions to represent the digits and zero; algebra type is also available. Dist. f. cubarithme slate.

Visually handicapped: a nonspecific term applying both to the blind and to the partially seeing.

CHAPTER II

METHODS AND PROCEDURES

The Sample

In the construction of test norms it is important that the selection of the norms sample be drawn in such a way as to minimize the inevitable sampling errors in the norms table. The most common method of drawing a norms sample is to select schools to be included in the norms and to test all students at the proper grade levels, that is, simple cluster sampling.

> Since schools usually differ markedly from each other in mean score, the sampling errors in the final norms table will ordinarily be large unless the number of schools in the norms sample is large. The number of students in the norms sample typically has only a weak and indirect relation to the size of the sampling errors in the norms table.....it is desirable that (i) a set of test norms should be based on a group that can be easily definitively described, (ii) is familiar to the consumer of test cores, (iii) includes as one of its members the examiner whose test score is to be interpreted. The norms group may itself satisfy the foregoing conditions, or it may be a more or less representative sample from a larger norms population that satisfies these conditions.[19]

In an attempt to minimize sampling error a relatively large representative set of schools in the south central region of the United

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[19]Frederic M. Lord, "Test Norms and Sampling Theory", Journal of Experimental Education, Vol. XXVII, June 1959, pp. 248-249.

States were chosen, and all students in Grades 4, 5, and 6 were tested. The schools were chosen in terms of practicability and economy of transportation, the flexibility of the school's schedule for testing, and the availability of the children for testing. In order that a cross-section of the population could be obtained from all socio-economic levels, sampling was limited to residential state schools for the blind. Also, these schools were comprised of blind students representative from all areas of the state. Written permission was obtained from the proper authorities or administrators of the schools in the following states to administer tests to the blind and partially seeing students in Grades 4, 5, and 6: Oklahoma, Arkansas, Tennessee, Kentucky, Missouri, Kansas, and Nebraska.

Two hundred and thirty-six children, who were totally blind or were partially seeing, in Grades 4, 5, and 6 were tested. Out of this number only 197 white students' scores were used, since the distribution of scores for other races were too small to warrent the construction of norms.

The distribution of schools and number of students by grade that cooperated in the collection of the data are shown in Table 1. The tabulations are constructed according to the students' ability to read Braille or Large Type. The column labeled "oral" shows the total number of pupils to whom Form 5B was administered. This number represents the combined group of Braille readers and Large Type readers who also took Form 5A. The only students reported are those whose raw scores were used in the development of the norms. The administrators of the schools made available the cumulative records on file. The records were

Table 1: Residential Schools for the Blind Cooperating in the Establishment of Norms of the SCAT, Level 5, Forms A (Written) and B (Oral).

Residential State Schools for the Blind	Number of Students Tested			
	Grade	Large Type	Braille	Oral
Muskogee, Oklahoma	4	4	4	8
	5	3	3	6
	6	3	6	9
Little Rock, Arkansas	4	4	8	12
	5	8	2	10
	6	6	3	9
Donelson, Tennessee	4	5	9	14
	5	6	5	11
	6	5	4	9
Louisville, Kentucky	4	1	9	10
	5	3	10	13
	6	3	7	10
St. Louis, Missouri	4	4	8	12
	5	3	7	10
	6	7	5	12
Kansas City, Kansas	4	1	9	10
	5	1	3	4
	6	7	3	10
Nebraska City, Nebraska	4	1	4	5
	5	3	4	7
	6	2	4	6
Total	4	20	51	71
	5	27	34	61
	6	33	32	65

necessary in order to obtain the pertinent biographical information for each student, i.e., name, birth date, grade, sex, race, number of years of blindness, and the number of years each studied Braille. Appendix A gives distribution of subjects by grade and sex for each school which shows relevant biographical information. If scores on the Wechsler Intelligence Scale for Children were available, these were also recorded (Appendix C).

The Test

Written permission was obtained to use the School and College Ability Test, Level 5, Form A and B for this study, hereinafter, referred to as SCAT.[20] The SCAT was chosen for the following reasons: (1) it can be easily administered, (2) it has high validity and reliability indexes for sighted children, (3) it permits comparison of scores from form to form, (4) it yields both a verbal and quantitative score, as well as a total score, (5) it is a group paper-and-pencil test of scholastic aptitude, and (6) it could be easily transcribed for the purposes of this study.[21]

After permission was obtained from the publishers to reprint SCAT, Level 5, Form A, and to record Form B, these forms were delivered to Dallas Services for the Blind, Dallas, Texas, for necessary transpositions. Form 5A was transcribed and multigraphed in Braille for use

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[20]Personal correspondence from Dr. Scarvia B. Anderson, Assistant Director and Editor, Cooperative Test Division, Educational Testing Service, Princeton, New Jersey, September 15, 1961.

[21]Educational Testing Service, SCAT Technical Report, (Princeton: Educational Testing Service, 1957), pp. 10-13.

with the totally blind students, as well as printed in Large Type for use with the partially sighted children. Form 5B was recorded on magnetic tape for use with both Braille readers and Large Type readers. Appropriate answer sheets were transcribed into Braille and printed in Large Type for recording answers to the oral revision of the test. Each answer sheet had five choices which were required for each item.

The Administration

The ultimate purpose of this study was to construct norms that could be utilized to the fullest value in working with blind children. In order to accomplish this purpose the selection of the test became a supreme undertaking. The first characteristic that the instrument must possess was ease of administration. The SCAT met this criterion. Although the SCAT had time limits established for use with the sighted, these time limits could not be used in testing blind students.

The time allowance established for the administration of the SCAT to sighted children is 15 minutes for Part I, 20 minutes for Part II, 10 minutes for Part III, and 25 minutes for Part IV, plus an additional 15 minutes for distribution of materials, general directions, and specific instructions for the different parts, or a total of 95 minutes. Since research in testing blind children suggested that it takes approximately three and one-half times longer to read Braille than it does to read ink print, the SCAT was administered without time limits.[22] Each child was permitted to complete every item on the test. Even

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[22]Caldwell, op. cit., pp. 1-28.

though no time limits were observed, a notation was made as to the approximate time it took the Braille readers to complete their tests.

The gneral directions as set out in the publication, SCAT Directions for Administering and Scoring, were followed explicitly in administering SCAT, Form 5A (written), the Braille Edition.[23] Each Braille reader was given a booklet. The printed Large Type Edition booklet was given to the Large Type readers. The responses to the respective items were indicated in the booklet by each pupil wherein he encircled the letter preceding the answer of his choice. This was done for all one hundred items of the test.

Because most of the students tested had not been tested in a group situation prior to this time, or in a situation in which they had to respond by encircling the answer of their choice, it was necessary to use a great deal of time on the initial directions in order that the Braille readers fully understood the directions that were to be followed. It should be pointed out that after the Braille readers thoroughly understood how to mark the test booklet, it was not necessary to repeat the general directions. However, at the outset of administration it was necessary for the administrator to show, by touch, each individual Braille reader exactly how to mark the booklet. The Braille reader encircled the answer of his choice by placing his finger on the letter preceding the selected response and then by drawing a line around the tip of his finger as it remained on that

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[23]Educational Testing Service, SCAT Direction for Administering and Scoring, (Princeton: Educational Testing Service, 1957), pp. 6-7.

letter. The Large Type readers had no difficulty in understanding the general directions on how to mark their booklets, because they could read and, therefore, see what had to be done. For each of the four parts of the test specific instructions were necessary because of the different nature of each of the parts. Specific directions were followed precisely as suggested in the manual. It was found that the students had relatively little difficulty in understanding these specific instructions once the general directions were made clear to them. However, in the directions for Part II, arithmetic computations, it was noted that without exception the pupils questioned the fifth choice entitled "none of these." This choice had to be made clear by extra explanations that did not appear in the manual of instructions.

Although Form 5B was recorded on magnetic tape to be used as an oral form of the test, a problem was encountered when it was first administered to the blind children. The taped test was not suitable because the speech moved at too rapid a pace for the children to have sufficient time to record their answers on the individual answer sheets. Also, many of the words were indistinct and could not be readily understood by the pupils. Consequently, the investigator had to administer Form 5B orally to all subjects. All one hundred items were read exactly as they appeared in the Form 5B test booklet. Because this form was read aloud to the students, it became necessary to adapt the directions to fit the situation. Individual answer sheets were brailled and printed in large type so that the respective pupils could record their response for each item. The child encircled his

choice on the individual answer sheet after the item with its answers was read twice. In Part II, Arithmetic Computation, and Part IV, Arithmetic Reasoning, the problems were read twice, time was allowed for computation, and the five suggested answers were then read twice. Sufficient time was allowed for marking the answers. For example, the directions for Parts I, II, III and IV were administered as follows:

Directions for Part I

Each question in Part I consists of a sentence in which one word is missing; the word "blank" indicates where the word has been removed from the sentence. After each sentence five words will be read, one of which is the missing word. You are to select the missing word by deciding which one of the five words best fits in with the meaning of the sentence, and on the answer sheet mark a circle around the number of the word you have chosen.

Sample Question

We had worked hard all day so that be evening we were quite ( ).

1. small 2. tired 3. old
4. untrained 5. intelligent

If you understand the sample sentence you will realize that "tired" is the missing word because none of the other words fits in with the meaning of the sentence. Next, on the answer sheet, you find the line numbered the same as the question. "Tired" is the correct word to use in the sample sentence, and its number is 2, so you circle the number 2 on the answer sheet. Now, if you understand, the test will begin.

Directions for Part II

There are twenty-five problems in Part II of the test. I will read each problem three times. The first time listen carefully to the problem, the second time write it down in Braille or pencil, the third time check the answer you wrote down. I will give you time to work the problem, then I will read the five suggested answers twice, you select the answer you think is correct. On the answer sheet mark a circle around the number of the answer you have chosen.

Sample Problem

5413	1.	586	3.	696	5.	None of
-4827	2.	596	4.	1586		these

Because the correct answer to the sample problem is 586, which is number 1, you will circle the number 1 on your answer sheet. Now, if you understand, the test will begin.

Directions for Part III

Each of the questions in Part III consists of one word followed by five words or phrases. Listen to the word or phrases, then pick from the words or phrases following it, the one whose meaning is closest to that word.

Sample Question

Chilly	1.	Tired	2.	Nice	3.	Dry
	4.	Cold	5.	Sunny		

In order to find the correct answer you listen to the word "chilly" and then listen for a word or phrase following it that has the same or almost the same meaning. When you do this you see that "cold" is the answer because "cold" is closest in meaning to the word "chilly." Next, on the answer sheet you find the number which is the same as the word you chose and circle it with your pencil. Because "cold" is the correct answer to the sample question, the space marked 4 on the answer sheet is circled. Now, if you understand, the test will begin.

Directions for Part IV

There are 25 problems in Part IV of the test. Following each problem there are five suggested answers. Work each problem in your head. Then listen to the five suggested answers and decide which one is correct. Circle the number on the answer sheet.

Sample Problem

Four $10-bills are equal to how many $5-bills?

1.	20	2.	10	3.	8
4.	40	5.	2		

Because the correct answer to the sample problem is 8, which is number 3, circle that number of the answer sheet. Now, if you understand, the test will begin.

Of the 100 test items, only one had to be adapted for the oral test. Number 18 of Part IV, which reads, "What part of the following circle is shaded black?" This had to be changed to read, "There are

eight parts to a circle, two parts are blackened, what part is blackened?"

It is common knowledge that Braille writing and arithmetic computation by the blind must of necessity be reproduced on specific mechanical devices. Therefore, it seems appropriate to point out the need for assembling various materials that are necessary in testing the blind. After it was determined which form of the test was to be given, (Braille, Large Type or oral), the following list of materials were assembled by the examiner and made available before test administration began:

For each Braille reader:

a. A short pencil about the size of a golf pencil, as this is the approximate size of the Braille stylus,
b. One Braille test booklet for Form A, or eight Braille answer sheets for Form B with student's name on them,
c. Braille slate and stylus, mechanical Braille writer, Taylor slate, or Cubarithme,
d. Scratch paper,
e. Extra curricular reading material to be used while waiting for others to finish test.

For each Large Type reader:

a. A pencil,
b. One Large Print test booklet for Form A, or four Large Print answer sheets for Form B,
c. Scratch paper,
d. Extra curricular reading material to be used while waiting for others to finish test.

For the test administrator:

a. A copy of the publication, SCAT Directions for Administering and Scoring,
b. A note book on which to record the starting and stopping time,
c. Extra styluses and pencils for the students.

The SCAT Test was administered to 197 blind and partially seeing children in seven different state schools for the blind by the investigator. The first school visited was the Oklahoma State School

for the Blind in Muskogee, Oklahoma. Adequate room space and suitable seating arrangements were made for the 20 children that were to be tested. Test materials were prepared and placed in the room for administration. The appropriate test booklet was selected for each child and his name and school were written on the outside cover. After all arrangements were made whereby testing could proceed without interruption, the biographical information was collected from the cumulative records on file in the principal's office. The individual intelligence test scores were secured from the records in the counselor's office. According to the test schedule as set up by the administrator, Form 5A (written) was administered in two testing sessions. At the next scheduled time of testing Form 5B (oral) was administered. After the same group of children completed both forms of the test, the test booklets and individual answer sheets were collected. Subsequently, this pattern of procedure was followed in the remaining six residential state schools for the blind. These schools were visited in the following order: Oklahoma State School for the Blind at Muskogee, Oklahoma, November 13 and 14, 1961; Arkansas State School for the Blind at Little Rock, Arkansas, November 16 and 17, 1961; Tennessee State School for the Blind at Donelson, Tennessee, November 27 and 28, 1961; Kentucky State School for the Blind at Louisville, Kentucky, November 30 and December 1, 1961; Missouri State School for the Blind at St. Louis, Missouri, December 4 and 5, 1961; Kansas State School for the Blind at Kansas City, Kansas, December 7 and 8, 1961; and Nebraska State School for the Blind at Nebraska City, Nebraska, December 11 and 12, 1961.

The Scoring and Recording of Data

In all cases the test booklets were hand scored to obtain the number of right responses (raw score), since the students marked their choice of the suggested answers for each item in the respective booklet. The answer sheets were also hand scored because they were not adapted to machine scoring.

The procedure followed to obtain the raw scores was the one recommended in the SCAT Scoring Manual.[24] First, all items were scanned to be sure only one choice was circled. If more than one choice was circled, the item was counted as wrong and a red line was drawn through it. Then, the items were checked for correctness, and the number correct for each part was recorded. Parts I and III were added together to obtain the verbal raw score. Parts II and IV were added together to obtain the quantitative raw score. The verbal and quantitative raw scores were then added together to obtain the total raw score. Raw scores were changed to converted scores by locating the converted score corresponding to the number of right answers for each part, using the conversion tables which appeared on the back of the SCAT scoring stencil. These converted scores were then recorded on specially prepared 4 x 6 index cards, which contained the biographical and other pertinent information for each student.

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[24] Ibid., p. 10.

CHAPTER III

PRESENTATION AND ANALYSIS OF THE DATA

The evaluation instrument, consisting of 100 items, was designed to aid in estimating the student's capacity to do academic work at the next higher level of learning. It was developed with the idea that it would measure the two most important kinds of school related abilities, that is, verbal and quantitative. There are four subtests with twenty-five items in each test. The items are multiple-choice type with the student chosing the best answer from among five suggested answers. The test yields three scores: a verbal score based on Parts I and III; a quantitative score based on Parts II and IV; and a total score based on all four parts.

It took approximately four hours and forty-five minutes on an average for the Braille readers to complete all one hundred items on the SCAT, Form A (written). The average time observed for the Large Type readers was only three and one-half hours. This would seem to indicate that the two groups should be separated when administering the written form of the SCAT to both groups simultaneously. However, it should be pointed out that no difficulty was encountered in the administration of the tests to both groups in the same room at the same time. A comparable

form of the SCAT, Form B (oral), was administered in approximately three hours at each school with both the Braille readers and Large Type readers tested together.

The test was also designed as a power test in which all items were completed by the examinees with the scores based on the number of items responded to correctly. After scoring, the number of correct responses were counted to obtain the raw scores. The raw scores were then changed to converted scores by using conversion tables listed on the backs of the appropriate stencil.

In Table 2 the converted score means and the standard deviation for Forms A and B are reported by grade for Large Type readers and Braille readers. The frequency distributions of the converted scores are shown in Appendix B. Scores for students in each school are combined by grade since the number of students tested in each school is relatively small.

While the major emphasis of the present investigation was upon the construction of norms, it seemed warranted to determine if statistically significant differences between converted score means existed between grades and forms of the tests. The "t" test was employed to test the hypotheses that no true mean differences existed between grades, or test forms.[25] The results of the "t" tests for comparison of converted score mean differences between Form A (written) and Form B (oral) for Large Type readers and Braille readers are given in Tables 3

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[25]J. P. Guilford, Fundamental Statistics in Psychology and Education, (New York: McGraw-Hill, 1956), p. 220.

Table 2: Converted Score Means and Standard Deviations of SCAT, Level 5, Forms A and B by Grades.

Large Type Readers

Form A: (Written)	Verbal			Quantitative			Total		
	N	Mean	S. D.	N	Mean	S. D.	N	Mean	S. D.
Grade 4	20	236.55	5.61	20	245.50	5.27	20	246.90	2.91
Grade 5	27	242.26	8.73	27	258.22	8.99	27	253.70	6.58
Grade 6	33	247.30	12.17	33	260.91	11.68	33	257.24	9.25
Form B: (Oral)									
Grade 4	20	238.75	5.33	20	248.90	4.18	20	249.00	2.68
Grade 5	27	242.41	8.16	27	255.82	10.30	27	252.59	5.83
Grade 6	33	250.33	10.84	33	261.54	10.95	33	258.88	8.63

Braille Readers

Form A: (Written)	Verbal			Quantitative			Total		
	N	Mean	S. D.	N	Mean	S. D.	N	Mean	S. D.
Grade 4	51	238.24	7.71	51	242.04	5.82	51	246.18	4.46
Grade 5	34	245.65	10.25	34	250.85	9.90	34	252.18	7.44
Grade 6	32	252.59	10.88	32	260.56	9.71	32	259.34	8.37
Form B: (Oral)									
Grade 4	51	242.16	8.53	51	246.33	7.10	51	249.12	4.72
Grade 5	34	254.00	11.16	34	252.88	9.87	34	252.88	7.99
Grade 6	32	251.31	10.63	32	262.59	12.88	32	260.19	9.60

and 4, respectively. It is noted that only at Grade 4 statistically significant "t" values were obtained. No statistically significant difference was found on the Verbal test, but on the Quantitative test and Total converted scores the differences were significant at the 0.05 level of significance for Large Type readers. For Braille readers the differences were all statistically significant beyond the 0.01 level of significance for all scores: verbal, quantitative and total. Hence, the null hypotheses were rejected for the differences between performance on the written form of the test and the oral form at Grade 4, except on the verbal part of the test for Large Type readers where the null hypothesis was accepted. Where true differences existed the performance was in favor of oral presentation. Perhaps this should be expected since fourth-grade blind children have not had the experience in reading Braille and Large Type but have had greater experience in handling oral communication. At the fifth- and sixth grade levels no statistically significant differences were found.

While the converted mean scores are progressively higher at each grade level, the standard deviations are sufficiently large to assure considerable overlapping of the distributions at the various levels. In order to determine whether the observed differences of mean scores by grade were true or chance differences, "t" tests were applied to the data for the verbal, quantitative, and total converted scores by test form.[26] The results of these statistical tests are

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[26] Ibid.

Table 3: Comparison of Converted Score Mean Difference on SCAT, Level 5, Form A (Written) and Form B (Oral) by Grade for Large Type Readers.

	Verbal			Quantitative			Total		
	M_{diff} (B-A)	SE_{diff}	t	M_{diff} (B-A)	SE_{diff}	t	M_{diff} (B-A)	SE_{diff}	t
Grade 4 (N=20)	2.20	1.25	1.76	3.40	1.29	2.64*	2.10	0.76	2.77*
Grade 5 (N=27)	0.30	1.34	0.22	-2.41	1.85	-1.30	1.10	0.96	-1.15
Grade 6 (N=33)	3.03	1.80	1.68	0.64	1.85	0.34	1.64	1.44	1.14

*Significant at the 0.05 level.

Table 4: Comparison of Converted Score Mean Difference on SCAT, Level 5, Form A (Written) and Form B (Oral) by Grade for Braille Readers.

	Verbal			Quantitative			Total		
	M_{diff} (B-A)	SE_{diff}	t	M_{diff} (B-A)	SE_{diff}	t	M_{diff} (B-A)	SE_{diff}	t
Grade 4 (N=51)	3.92	0.97	4.03**	4.29	0.99	4.35**	2.94	0.54	5.45**
Grade 5 (N=34)	-0.65	1.75	-0.37	2.03	1.56	1.30	0.71	1.23	0.57
Grade 6 (N=32)	-1.59	1.28	-1.24	2.03	1.58	1.28	0.84	1.03	0.82

**Significant at the 0.01 level.

shown in Tables 5 and 6 for Large Type readers and Braille readers, respectively.

From these comparisons it is noted that most of the mean differences are statistically significant beyond the 0.05 level of significance in favor of the next higher grade for Large Type readers, and with the exception of one comparison all are statistically significant for Braille readers. The mean difference between Grades 5 and 6 of Form A (written) for the verbal, quantitative and total scores for Large Type readers was only a chance difference, hence the null hypothesis was accepted. A chance difference also occurred between Grades 4 and 5 of the verbal scores on Form B. In all other cases the null hypotheses were rejected, which indicates that the mean performance on the tests were significantly greater for each subsequent grade. A similar interpretation is made in view of the Braille readers.

Table 7 presents the correlation between SCAT, Level 5, converted scores for Forms A and B, and WISC scores for the combined Grades 4, 5, and 6. Because WISC scores were not available for all children and since this decreased the size of the sample, the grades were combined in order to have an adequate number in the sample. The Pearson product-moment coefficient of correlation was computed in order to show the extent to which the converted scores for each subtest of Forms A and B were related to the intelligence quotients obtained from the WISC.[27] Available WISC scores are presented in Appendix C.

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[27] Ibid., p. 140.

Table 5: Comparison of Converted Score Means on SCAT, Level 5, Form A (Written) and Form B (Oral) Between Grades for Large Type Readers.

Subtest	Mean		$Mean_{diff}$	SE_{diff}	t
Verbal					
Form A					
Grade 4-5	236.55	242.26	-5.71	2.28	-2.50*
Grade 4-6	236.55	247.30	-10.75	2.95	-3.64**
Grade 5-6	242.26	247.30	-5.04	2.84	-1.77
Form B					
Grade 4-5	238.75	242.41	-3.66	2.14	-1.71
Grade 4-6	238.75	250.33	-11.58	2.65	-4.37**
Grade 5-6	242.41	250.33	-7.92	2.57	-3.08**
Quantitative					
Form A					
Grade 4-5	245.50	258.22	-12.72	2.60	-4.89**
Grade 4-6	245.50	260.91	-15.41	3.54	-4.35**
Grade 5-6	258.22	260.91	-2.69	3.47	-0.78**
Form B					
Grade 4-5	248.90	255.82	-6.92	2.49	-2.78**
Grade 4-6	248.90	261.54	-12.64	2.61	-4.85**
Grade 5-6	255.82	261.54	-5.72	2.81	-2.03**
Total					
Form A					
Grade 4-5	246.90	253.70	-6.80	1.61	-4.22**
Grade 4-6	246.90	257.24	-10.34	2.17	-4.76**
Grade 5-6	253.70	257.24	-3.54	2.15	-1.64
Form B					
Grade 4-5	249.00	252.59	-3.59	1.43	-2.51*
Grade 4-6	249.00	258.88	-9.88	2.02	-4.88**
Grade 5-6	252.59	258.88	-6.29	1.98	-3.18**

* Significant at 0.05 level.
**Significant at 0.01 level.

Table 6: Comparison of Converted Score Means on SCAT, Level 5, Form A (Written) and Form B (Oral) Between Grades for Braille Readers.

Subtest	Mean		$Mean_{diff}$	SE_{diff}	t
Verbal					
Form A					
Grade 4-5	238.24	245.65	-7.41	1.975	-3.75**
Grade 4-6	238.24	252.59	-14.35	2.069	-6.94**
Grade 5-6	245.65	252.59	-6.94	2.641	-2.63*
Form B					
Grade 4-5	242.16	245.00	-2.84	2.166	-1.31
Grade 4-6	242.16	251.31	-9.15	2.114	-4.33**
Grade 5-6	245.00	251.31	-6.31	2.690	-2.35*
Quantitative					
Form A					
Grade 4-5	242.04	250.85	-8.81	1.729	-5.095**
Grade 4-6	242.04	260.56	-18.52	1.533	-12.08**
Grade 5-6	250.85	260.56	-9.71	2.450	-3.96**
Form B					
Grade 4-5	246.33	252.88	-6.55	1.864	-3.51**
Grade 4-6	246.33	262.59	-16.26	2.179	-7.46**
Grade 5-6	252.88	262.59	-9.71	2.806	-3.46**
Total					
Form A					
Grade 4-5	246.18	252.18	-6.00	1.106	-5.42**
Grade 4-6	246.18	259.34	-13.16	1.232	-10.68**
Grade 5-6	252.18	259.34	-7.16	1.529	-4.68**
Form B					
Grade 4-5	249.12	252.88	-3.76	1.397	-2.69**
Grade 4-6	249.12	260.19	-11.07	1.601	-6.91**
Grade 5-6	252.88	260.19	-7.31	2.202	-3.32**

* Significant at 0.05 level.
**Significant at 0.01 level.

For Large Type readers on Form A (written), verbal subtest, a correlation was found to be 0.539. On Form B (oral), verbal subtest, a correlation of 0.518 was calculated. These correlations were in the high correlation range, which indicated a marked relationship between the verbal abilities and the intelligence quotient for these Large Type readers. On the quantitative subtest of Form A (written) a correlation of 0.512 was obtained, and on Form B (oral) a correlation of 0.457 was found. These correlations fell within the moderate correlation range, which showed a moderate relationship between quantitative abilities and intelligence quotient test scores.

Hull[28] stated that the minimum validity coefficient for a test of practical usefulness was about 4 = 0.45. As can be observed from the foregoing computations, all of the correlation indices were above 0.45. Therefore, it can be concluded that this test used as a measure of scholastic ability for Large Type readers was tenable.

For Braille readers on Form A (written), verbal subtest, a correlation was found to be 0.336. On Form B (oral), verbal subtest, a correlation of 0.364 was found. These correlations were in the moderate correlation range with a substantial relationship between verbal abilities and intelligence quotient test scores. However, it should be noted that there was a higher correlation between Form B (oral) verbal scores and the I. Q. scores, than between Form A (written) verbal scores and the

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[28]C. L. Hull, Aptitude Testing, World Book Company, (Yonkers, New York: World Book Company, 1928), Chapter VIII.

Table 7: Correlation between SCAT, Level 5, Converted Scores (Forms A and B) and WISC Scores Combined grades 4, 5 and 6.

	Subtests	Correlations	
		Form A (Written)	Form B (Oral)
Large Type Readers (N=57)	Verbal	0.539	0.518
	Quantitative	0.512	0.457
Braille Readers (N=92)	Verbal	0.336	0.364
	Quantitative	0.208	0.164

I. Q. scores. It was assumed that the reason for this difference was due to the fact that the Braille readers depended on their hearing to a greater extent in the learning process. On the quantitative subtest for Form A (written) a correlation of 0.208 was obtained. While on Form B (oral) a correlation of 0.164 was found. These correlations fell within the low correlation range with a definite, but small relationship present.

From a careful study of the correlations in Table 7 the following may be observed: of the two groups for which correlations were calculated, the Large Type readers had higher correlations than the Braille readers. The highest correlation was on the verbal subtest of Form A (written) for Large Type readers. The highest correlation for the Braille readers was on the verbal subtest of Form B (oral). Both groups correlations were lower on the quantitative subtests of Form B (oral) than on Form A (written). Perhaps the low correlations which existed for the Braille readers were due to the inability of the students tested to read and write Braille efficiently. And, that the higher correlations for the Large Type readers resulted because of their facility to read and write Large Print.

CHAPTER IV

CONSTRUCTION OF TEST NORMS

For the purpose of interpreting test scores attained by partially seeing and blind children in the intermediate grades of seven residential state schools for the blind, it was necessary to construct local test norms. By following the statistical procedure as set forth in the SCAT Manual for Interpreting Scores, local SCAT norms were established.[29]

The SCAT raw scores obtained by testing students at each of the seven residential state schools for the blind were changed to converted scores by use of the conversion tables which appear on the back of the scoring stencils for each form. These converted scores were then separated by form into Braille readers and Large Type readers. A further separation was made by grade level. However, it was soon ascertained that proper construction of local norms could not be calculated by grade because of the samll number of pupils at each grade level. Therefore, the scores by grade were combined.

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[29]Educational Testing Service, SCAT Manual for Interpreting Scores, (Princeton: Educational Testing Service, 1957), pp. 14-19.

Preparation of Score Distribution

For each of the subtests, verbal, quantitative and total, the highest two-score intervals were ascertained and placed at the tope of a sheet of ruled paper supplied by Educational Testing Service. Then two-score intervals down to the lowest two-score intervals were recorded in descending order in the first column. Care was taken that no score groups overlapped; for example, if the two groups 258-259 and 259-260 were listed, a score of 259 could not be placed in the proper score group. A tally was made for the number of students whose scores fell in each score group, which was recorded in the proper place in the second column. The tallies were added to obtain the frequencies at that score interval.

The Computation of Percentile Ranks And Percentile Ranks

Cumulative frequencies were obtained by adding the frequencies from the bottom up, so that the number opposite each score group equaled the sum of the frequency for that group and all the frequencies for all the groups below it. The number opposite the highest score group should equal the total number of students in the norms group. These cumulative frequencies were recorded in an adjacent column.

> The percentile rank for any two-score interval is determined by
> (a) finding one half the frequency for that score group,
> (b) adding the result of (a) to the cumulative frequency for the score group just below the group in question,
> (c) dividing the result of (b) by the total number of students in the norms group (taking the answer to the nearest hundredth), and
> (d) multiplying the answer from (c) by 100.[30]

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[30] Ibid., p. 15.

The percentile rank was then recorded in the next column.

The basic information necessary for the computation of percentile bands was provided in three tables listed in the test manual.[31] Percentile bands must be computed at the level at which score interpretations will be made. The level at which the percentile bands were computed for this study was Level 5.

> The steps assigning a percentile band to a score group are as follows:
>
> 1. Find the score group in the left hand column of the appropriate Verbal, Quantitative, or Total Interval Table.
> 2. Find the corresponding interval in the appropriate Level Column.
> 3. If the interval is 1, count up one score group from the score group in question. Record the percentile rank for that score group to the right of the dash in the space in column 6 corresponding to the score group you are establishing a band for. Then count down one score group from the score group in question and record the percentile rank for that group to the left of the dash in the percentile band. If the interval is 2, count up and down two score groups to find the percentile ranks corresponding to the upper and lower limits for the percentile band, If the interval is 3, count up and down three intervals to find the percentile ranks corresponding to the upper and lower limits for the percentile band.
> 4. If the score group for which you are trying to compute a percentile band is near the top or the bottom of the distribution so that counting up or down one, two, or three groups takes you beyond the computed percentile ranks, record 100 or 0 as the upper or lower limit of the band.[32]

The foregoing steps were calculated in order to establish the local norms for Large Type and Braille readers in the combined 4th, 5th, and 6th grades attending seven residential state schools for the blind. Tables 8 through 11 contain the established norms.

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[31] Ibid., p. 17-19.

[32] Ibid., p. 15.

Table 8: Individual Score Norms for SCAT, Form A., Level 5, Grades 4, 5, and 6 Combined (Fall Testing): Large Type Readers.

Converted Score	Percentile Band		
	Verbal	Quantitative	Total
288 - 289		99 - 100	
286 - 287		99 - 99	
284 - 285		98 - 99	
282 - 283		98 - 99	
280 - 281		97 - 99	
278 - 279		96 - 98	
276 - 277		91 - 98	98 - 100
274 - 275		86 - 98	98 - 99
272 - 273		85 - 97	94 - 99
270 - 271	95 - 100	84 - 96	92 - 98
268 - 269	93 - 100	80 - 91	90 - 94
266 - 267	93 - 98	72 - 86	88 - 92
264 - 265	91 - 98	62 - 85	85 - 90
262 - 263	88 - 97	56 - 84	82 - 88
260 - 261	85 - 95	56 - 72	78 - 85
258 - 259	84 - 93	51 - 62	71 - 82
256 - 257	83 - 91	43 - 56	62 - 78
254 - 255	80 - 88	39 - 51	52 - 71
252 - 253	76 - 85	33 - 43	44 - 62
250 - 251	71 - 84	26 - 39	31 - 52
248 - 249	71 - 80	23 - 33	18 - 44
246 - 247	64 - 76	19 - 26	11 - 31
244 - 245	56 - 71	14 - 23	6 - 18
242 - 243	46 - 64	10 - 19	2 - 11
240 - 241	36 - 56	6 - 14	0 - 6
238 - 239	30 - 46	2 - 10	
236 - 237	26 - 36	0 - 6	
234 - 235	17 - 30		
232 - 233	8 - 26		
230 - 231	5 - 17		
228 - 229	4 - 8		
226 - 227	2 - 5		
224 - 225	0 - 4		
Median	242	256	252
Lower Quartile	234	248	247
Upper Quartile	248	263	257

Based on 80 students in 7 schools.

Table 9: Individual Score Norms for SCAT, Form B, Level 5, Grades 4, 5, and 6 Combined (Fall Testing): Large Type Readers.

Converted Score	Percentile Band		
	Verbal	Quantitative	Total
284 - 285		99 - 100	
282 - 283		95 - 100	99 - 100
280 - 281		94 - 99	99 - 99
278 - 279		93 - 99	97 - 99
276 - 277	98 - 100	91 - 98	96 - 99
274 - 275	98 - 100	89 - 95	96 - 98
272 - 273	96 - 100	86 - 94	96 - 97
270 - 271	94 - 99	81 - 93	96 - 96
268 - 269	92 - 98	76 - 91	95 - 96
266 - 267	92 - 98	71 - 89	91 - 96
264 - 265	92 - 97	67 - 86	85 - 95
262 - 263	90 - 96	61 - 81	79 - 91
260 - 261	88 - 94	61 - 71	70 - 85
258 - 259	85 - 92	56 - 67	64 - 79
256 - 257	82 - 92	51 - 61	59 - 70
254 - 255	79 - 90	43 - 56	52 - 64
252 - 253	74 - 88	36 - 51	41 - 59
250 - 251	66 - 85	28 - 43	25 - 52
248 - 249	58 - 82	18 - 36	23 - 41
246 - 247	58 - 74	9 - 28	4 - 25
244 - 245	49 - 66	6 - 18	1 - 23
242 - 243	37 - 58	4 - 9	0 - 4
240 - 241	26 - 49	2 - 6	
238 - 239	18 - 37	1 - 4	
236 - 237	11 - 26	0 - 2	
234 - 235	7 - 18		
232 - 233	5 - 11		
230 - 231	2 - 7		
228 - 229	0 - 5		
Median	243	254	252
Lower Quartile	238	248	248
Upper Quartile	249	264	259

Based on 80 students in 7 schools.

Table 10: Individual Score Norms for SCAT, Form A, Level 5, Grades 4, 5, and 6 Combined (Fall Testing): Braille Readers.

Converted Score	Percentile Band		
	Verbal	Quantitative	Total
284 - 285		99 - 100	
282 - 283		99 - 100	
280 - 281		99 - 99	
278 - 279		96 - 99	
276 - 277		96 - 99	97 - 100
274 - 275	96 - 100	95 - 99	97 - 99
272 - 273	95 - 100	94 - 97	96 - 98
270 - 271	93 - 100	91 - 96	94 - 97
268 - 269	90 - 99	90 - 96	93 - 96
266 - 267	90 - 97	87 - 95	90 - 94
264 - 265	89 - 96	82 - 94	88 - 93
262 - 263	87 - 95	76 - 91	85 - 90
260 - 261	84 - 93	76 - 87	81 - 88
258 - 259	82 - 90	70 - 82	75 - 85
256 - 257	79 - 89	65 - 76	68 - 81
254 - 255	74 - 87	62 - 70	62 - 75
252 - 253	68 - 84	59 - 65	55 - 68
250 - 251	63 - 82	52 - 62	43 - 62
248 - 249	63 - 74	46 - 59	30 - 55
246 - 247	57 - 68	41 - 52	20 - 43
244 - 245	50 - 63	35 - 46	14 - 30
242 - 243	42 - 57	28 - 41	6 - 20
240 - 241	36 - 50	22 - 35	0 - 14
238 - 239	27 - 42	10 - 28	
236 - 237	18 - 36	0 - 22	
234 - 235	10 - 27		
232 - 233	6 - 18		
230 - 231	5 - 10		
228 - 229	5 - 6		
226 - 227	2 - 5		
224 - 225	0 - 5		
Median	242	248	249
Lower Quartile	236	239	245
Upper Quartile	251	258	256

Based on 117 students in 7 schools.

Table 11: Individual Score Norms for SCAT, Form B, Level 5, Grades 4, 5, and 6 Combined (Fall Testing): Braille Readers.

Converted Score	Percentile Band		
	Verbal	Quantitative	Total
286 - 287		99 - 100	
284 - 285		99 - 99	
282 - 283		98 - 99	
280 - 281		96 - 99	
278 - 279		94 - 99	98 - 100
276 - 277		93 - 99	97 - 100
274 - 275		90 - 98	97 - 99
272 - 273	96 - 100	85 - 96	95 - 98
270 - 271	94 - 100	83 - 94	92 - 97
268 - 269	91 - 100	81 - 93	90 - 95
266 - 267	91 - 98	78 - 90	87 - 92
264 - 265	90 - 97	76 - 85	84 - 90
262 - 263	87 - 96	73 - 83	81 - 87
260 - 261	85 - 94	73 - 78	76 - 84
258 - 259	80 - 91	68 - 76	70 - 81
256 - 257	74 - 90	63 - 73	63 - 76
254 - 255	70 - 87	59 - 68	56 - 70
252 - 253	66 - 85	53 - 63	46 - 63
250 - 251	59 - 80	44 - 59	32 - 56
248 - 249	59 - 70	34 - 53	20 - 46
246 - 247	52 - 66	26 - 44	12 - 32
244 - 245	44 - 59	19 - 34	7 - 20
242 - 243	36 - 52	15 - 26	3 - 12
240 - 241	27 - 44	11 - 19	0 - 7
238 - 239	18 - 36	5 - 15	
236 - 237	13 - 27	0 - 11	
234 - 235	9 - 18		
232 - 233	6 - 13		
230 - 231	3 - 9		
228 - 229	2 - 6		
226 - 227	1 - 3		
224 - 225	0 - 2		
Median	244	250	251
Lower Quartile	239	244	248
Upper Quartile	253	260	258

Based on 117 students in 7 schools.

CHAPTER V

SUMMARY AND DISCUSSION

After the development of the Binet-Simon Tests of intelligence in 1905, several revisions and adaptations were published. From these revisions educators became especially interested in adapting these tests for use with the blind. In 1914 Irwin, a blind educator, and Goddard, a translator of the Binet-Simon Tests into English, adapted these tests for use with the blind. A statistical comparison of Terman's study with sighted children indicated that the new Irwin-Binet adaptation was fairly satisfactory in classifying the intelligence of blind children. As a consequence educators became more acutely aware of the need for a better revision of the Binet. Out of this awareness grew Irwin and Hayes's Scissors and Paste Guide of the Binet-Simon Intelligence Tests; Hayes's Condensed Guide of 1930; and, finally an adaptation of Terman and Merrill's revision known as the Hayes-Binet. The Hayes-Binet is recognized today as the outstanding measure of individual intelligence for the blind. However, due to the lack of trained personnel the use of this test is limited. The Wechsler Intelligence Scale for Children is preferred in schools for the blind for measuring the intelligence of each student because of the ease in administration, scoring, and

interpretation by the untrained examiner.

After this revolutionary development of the Hayes-Binet, an individual intelligence test for blind children, the field of group testing evolved. Some of the group tests which were successful with the sighted were adapted for use with the blind, but I. Q.'s obtained from these group intelligence tests were significantly lower than those obtained from the Hayes-Binet and the WISC.

Consequently, due to the lack of valid and reliable group instruments for measuring intelligence of the blind, this study was conceived. The SCAT, a valid and reliable instrument for testing the intelligence of sighted children, was used in this study. The SCAT was selected because it is easily administered, scored and interpreted; it permits comparison of scores from form to form; it yields both a verbal and quantitative score, as well as total score; and it is a group paper-and-pencil test of scholastic aptitude which is easily transposed for the purpose of this study.

Permission was obtained from the publishers of SCAT to transcribe and multigraph into Braille Form 5A for use with the totally blind students, as well as to print in Large Type the test for use with the partially sighted children. Permission was also obtained to record Form B on magnetic tape for use with both Braille and Large Type readers. Appropriate answer sheets were transposed for recording answers for Form B.

The primary purpose of this study was the construction of group intelligence test norms for blind children. Because it is important that the selection of the norms sample be drawn in such a way as to

minimize the inevitable sampling errors in the norms table, simple cluster sampling was utilized. All students in grades 4, 5, and 6 attending seven residential state schools for the blind in the south central region of the United States were tested. Out of two hundred and thirty-six children, who were totally blind or partially seeing, only one hundred and ninety-six white students' scores were used since the distribution of scores for other races were too small to warrant the construction of norms. After the raw scores were obtained by hand scoring, the scores were then converted through use of conversion tables which appears on the back of the SCAT scoring stencils.

While the major emphasis of this study was upon the construction of norms, it seemed warranted to determine if statistically significant differences between converted score means existed among grades and forms of the test. The "t" test was employed to test the hypotheses that no true mean differences existed for either grade or test form. In order to determine whether the observed differences in means by grade were true or chance differences, "t" tests were applied to the data for the verbal, quantitative and total converted mean scores by test form. The Pearson product-moment coefficient of correlation was computed between SCAT, Level 5, converted scores for Forms A and B, and WISC scores for the combined Grades 4, 5, and 6. Local SCAT norms were established for the purpose of interpreting test scores attained by partially seeing and blind children in the intermediate grades of seven residential state schools for the blind by following the statistical procedure as set forth in the SCAT Manual for Interpreting Scores.

The null hypotheses were rejected for the differences between performance on the written form of the test and the oral form at Grade 4, except on the verbal part of the test for Large Type readers where the null hypothesis was accepted. Where true differences existed the performance was in favor of oral presentation. At the 5th and 6th grade levels no statistically significant differences were found.

The mean difference between Grades 5 and 6 of Form A (Written) for the verbal, quantitative, and total scores for Large Type readers was only a chance difference, hence the null hypothesis was accepted. A chance difference also occurred between Grades 4 and 5 of the verbal scores on Form B (Oral). In all other cases the null hypotheses were rejected, which indicated that the mean performance on the tests were significantly greater for each subsequent grade. A similar interpretation was made for the Braille readers.

For Large Type readers on Forms A and B, verbal subtest, the correlations were found to be in the high correlation range, which indicated a marked relationship between the verbal abilities and the intelligence quotient for these readers. Correlations for the quantitative subtest of Form A and B fall within the moderate correlation range, which showed a moderate relationship between quantitative abilities and intelligence quotient test scores for Large Type readers. It can be concluded that this test used as a measure of scholastic ability for Large Type readers was tenable. For Braille readers on Forms A and B, verbal subtest, the correlations were in the moderate correlation range with a substantial relationship between verbal abilities and intelligence quotient test scores. On the quantitative

subtest for Forms A and B the correlations fell within the low correlation range with a definite but small relationship present for Braille readers.

Local norms were established for Large Type and Braille readers in the combined 4th, 5th, and 6th grades attending seven residential state schools for the blind.

The number of valid and reliable instruments for measuring the intelligence of blind children in a group situation is meager. It is the responsibility of educators interested in the blind to develop and adapt more effective instruments for the measurement of the intelligence of the blind. Most of the measuring instruments now available for sighted children can be utilized for Large Print readers. However, additional research is needed in the area of the development of tests which measure scholastic ability for Braille readers. The problem encountered in the needed research for Braille readers is in the development of a test of intelligence which requires no vision, yet measures both verbal and quantitative abilities.

From the outset, the major desired outcome for this investigation was the establishment of local norms for use with blind children in residential state schools for the blind. Only one hundred and ninety-seven students in seven residential state schools for the blind were utilized in this study, and it should be emphasized that additional research should be accomplished by sampling a larger population and thereby establishing national norms for the blind.

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APPENDIX A

Table 12: Biographical Information of Large Type Readers in Residential Schools by State.

Biographical Information		Muskogee, Oklahoma	Little Rock, Arkansas	Donelson, Tennessee	Louisville, Kentucky	St. Louis, Missouri	Kansas City, Kansas	Nebraska City, Nebraska
Grade 4 (N)	Male	2	.3	3	0	2	1	0
	Female	2	1	2	1	2	0	1
Grade 5 (N)	Male	3	4	5	2	2	0	2
	Female	0	4	1	1	1	1	1
Grade 6 (N)	Male	3	5	3	3	6	6	3
	Female	0	1	2	0	1	1	0
Median Age (Months) Combined Grades	Male	134	142	154	143	155	144	139
	Female	132	148	143	132	146	148	132
Median Months Blind Combined Grades	Male	133	138	154	143	155	144	139
	Female	132	144	143	132	146	148	132
Median Months of Braille Study Combined Grades	Male	60	60	60	72	48	72	66
	Female	48	60	60	54	60	66	54

Table 13: Biographical Information of Braille Readers in Residential Schools by State.

Biographical Information		Muskogee, Oklahoma	Little Rock, Arkansas	Donelson, Tennessee	Louisville, Kentucky	St. Louis, Missouri	Kansas City, Kansas	Nebraska City, Nebraska
Grade 4 (N)	Male	3	7	4	8	2	3	4
	Female	1	1	5	2	5	6	0
Grade 5 (N)	Male	1	1	3	7	5	2	2
	Female	2	1	2	3	2	1	2
Grade 6 (N)	Male	3	2	1	4	4	1	2
	Female	3	1	3	3	1	2	2
Median Age (Months) Combined Grades	Male	138	143	158	132	140	127	133
	Female	123	132	143	140	136	127	136
Median Months Blind Combined Grades	Male	119	143	158	132	136	114	133
	Female	123	132	143	140	129	120	136
Median Months of Braille Study Combined Grades	Male	60	60	54	60	72	48	48
	Female	72	60	48	60	48	60	66

APPENDIX B

Table 14: Frequency Distribution of SCAT, Level 5, Form A (Written) Verbal Converted Scores for Large Type Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
270 - 271	2	80	99
268 - 269	0	78	98
266 - 267	1	78	97
264 - 265	2	77	95
262 - 263	1	75	93
260 - 261	3	74	91
258 - 259	2	71	88
256 - 257	2	69	85
254 - 255	0	67	84
252 - 253	1	67	83
250 - 251	4	66	80
248 - 249	2	62	76
246 - 247	6	60	71
244 - 245	5	54	64
242 - 243	8	49	56
240 - 241	8	41	46
238 - 239	8	33	36
236 - 237	2	25	30
234 - 235	4	23	26
232 - 233	11	19	17
230 - 231	4	8	8
228 - 229	0	4	5
226 - 227	1	4	4
224 - 225	3	3	2

M = 242.04

Sum X = 6,478

Sum X^2 = 1,576,517

Table 15: Frequency Distribution of SCAT, Level 5, Form A (Written), Quantitative Converted Scores for Large Type Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
288 - 289	1	80	99
286 - 287	0	79	99
284 - 285	0	79	99
282 - 283	1	79	98
280 - 281	0	78	98
278 - 279	0	78	98
276 - 277	1	78	97
274 - 275	1	77	96
272 - 273	6	76	91
270 - 271	2	79	86
268 - 269	0	68	85
266 - 267	2	68	84
264 - 265	4	66	80
262 - 263	8	62	72
260 - 261	9	54	62
258 - 259	0	45	56
256 - 257	9	45	51
254 - 255	3	36	43
252 - 253	3	33	39
250 - 251	7	30	33
248 - 249	4	23	26
246 - 247	1	19	23
244 - 245	5	18	19
242 - 243	3	13	14
240 - 241	4	10	10
238 - 239	2	6	6
236 - 237	4	4	2

M = 254.88

Sum X = 6,831

Sum X^2 = 1,753,131

Table 16: Frequency Distribution of SCAT, Level 5, Form A (Written), Total Converted Scores for Large Type Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
276 - 277	1	80	99
274 - 275	0	79	99
272 - 273	2	79	98
270 - 271	3	77	94
268 - 269	1	74	92
266 - 267	2	73	90
264 - 265	2	71	88
262 - 263	2	69	85
260 - 261	3	67	82
258 - 259	4	64	78
256 - 257	6	60	71
254 - 255	9	54	62
252 - 253	7	45	52
250 - 251	5	38	44
248 - 249	16	33	31
246 - 247	6	17	18
244 - 245	4	11	11
242 - 243	4	7	6
240 - 241	3	3	2

M = 252.61

Sum X = 6,759

Sum X^2 = 1,714,986

Table 17: Frequency Distribution of SCAT, Level 5, Form B (Oral), Verbal Converted Scores for Large Type Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
276 - 277	2	80	99
274 - 275	0	78	98
272 - 273	0	78	98
270 - 271	0	78	98
268 - 269	1	78	97
266 - 267	0	77	96
264 - 265	3	77	94
262 - 263	0	74	92
260 - 261	1	74	92
258 - 259	2	73	90
256 - 257	2	71	88
254 - 255	2	69	85
252 - 253	2	67	82
250 - 251	4	65	79
248 - 249	4	61	74
246 - 247	9	57	66
244 - 245	4	48	58
242 - 243	10	44	49
240 - 241	9	34	37
238 - 239	8	25	26
236 - 237	6	17	18
234 - 235	5	11	11
232 - 233	1	6	7
230 - 231	2	5	5
228 - 229	3	3	2

M = 243.83

Sum X = 6,527

Sum X^2 = 1,600,279

Table 18: Frequency Distribution of SCAT, Level 5, Form B (Oral) Quantitative Converted Scores for Large Type Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
284 - 285	1	80	99
282 - 283	0	79	99
280 - 281	2	79	98
278 - 279	2	77	95
276 - 277	0	75	94
274 - 275	1	75	93
272 - 273	2	74	91
270 - 271	1	72	89
268 - 269	4	71	86
266 - 267	4	67	81
264 - 265	5	63	76
262 - 263	2	58	71
260 - 261	5	56	67
258 - 259	4	51	61
256 - 257	4	47	56
254 - 255	5	43	51
252 - 253	7	38	43
250 - 251	5	31	36
248 - 249	7	26	28
246 - 247	10	19	18
244 - 245	4	9	9
242 - 243	1	5	6
240 - 241	2	4	4
238 - 239	1	2	2
236 - 237	1	1	1

M = 255.42

Sum X = 6,839

Sum X^2 = 1,756,835

Table 19: Frequency Distribution of SCAT, Level 5, Form B (Oral), Total Converted Scores for Large Type Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
282 - 283	1	80	99
280 - 281	0	79	99
278 - 279	0	79	99
276 - 277	1	79	98
274 - 275	1	78	97
272 - 273	0	77	96
270 - 271	0	77	96
268 - 269	0	77	96
266 - 267	2	77	95
264 - 265	5	75	91
262 - 263	4	70	85
260 - 261	6	66	79
258 - 259	8	60	70
256 - 257	2	52	64
254 - 255	6	50	59
252 - 253	5	44	52
250 - 251	13	39	41
248 - 249	12	26	25
246 - 247	9	14	23
244 - 245	4	5	4
242 - 243	1	1	1

M = 253.49

Sum X = 6,781

Sum X^2 = 1,725,940

Table 20: Frequency Distribution of SCAT, Level 5, Form A (Written), Verbal Converted Scores for Braille Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
274 - 275	1	117	99
272 - 273	0	116	99
270 - 271	4	116	97
268 - 269	0	112	96
266 - 267	2	112	95
264 - 265	3	110	93
262 - 263	2	107	90
260 - 261	1	105	89
258 - 259	4	104	87
256 - 257	4	100	84
254 - 255	1	96	82
252 - 253	4	95	79
250 - 251	9	91	74
248 - 249	4	82	68
246 - 247	9	78	63
244 - 245	5	69	57
242 - 243	12	64	50
240 - 241	6	52	42
238 - 239	7	46	36
236 - 237	14	39	27
234 - 235	9	25	18
232 - 233	9	16	10
230 - 231	1	7	6
228 - 229	0	6	5
226 - 227	0	6	5
224 - 225	6	6	2

M = 245.83

Sum X = 9,525

Sum X^2 = 2,332,770

Table 21: Frequency Distribution of SCAT, Level 5, Form A (Written), Quantitative Converted Scores for Braille Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
284 - 285	1	117	99
282 - 283	0	116	99
280 - 281	0	116	99
278 - 279	1	116	99
276 - 277	2	115	97
274 - 275	1	113	96
272 - 273	0	112	96
270 - 271	1	112	95
268 - 269	2	111	94
266 - 267	4	109	91
264 - 265	0	105	90
262 - 263	6	105	87
260 - 261	7	99	82
258 - 259	6	92	76
256 - 257	7	86	70
254 - 255	6	79	65
252 - 253	1	73	62
250 - 251	6	72	59
248 - 249	10	66	52
246 - 247	5	56	46
244 - 245	5	51	41
242 - 243	9	46	35
240 - 241	8	37	28
238 - 239	6	29	22
236 - 237	23	23	10

M = 244.48

Sum X = 9,737

Sum X^2 = 2,435,968

Table 22: Frequency Distribution of SCAT, Level 5, Form A (Written), Total Converted Scores for Braille Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
276 - 277	2	117	99
274 - 275	1	115	98
272 - 273	0	114	97
270 - 271	2	114	96
268 - 269	3	112	94
266 - 267	1	109	93
264 - 265	4	108	90
262 - 263	2	104	88
260 - 261	6	102	85
258 - 259	3	96	81
256 - 257	10	93	75
254 - 255	7	83	68
252 - 253	6	76	62
250 - 251	12	70	55
248 - 249	15	58	43
246 - 247	15	43	30
244 - 245	8	28	20
242 - 243	7	20	14
240 - 241	13	13	6

M = 252.57

Sum X = 9,809

Sum X^2 = 2,470,113

Table 23: Frequency Distribution of SCAT, Level 5, Form B (Oral), Verbal Converted Scores for Braille Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
272 - 273	2	117	99
270 - 271	0	115	98
268 - 269	2	115	97
266 - 267	1	113	96
264 - 265	5	112	94
262 - 263	0	107	91
260 - 261	4	107	90
258 - 259	3	103	87
256 - 257	2	100	85
254 - 255	9	98	80
252 - 253	5	89	74
250 - 251	3	84	70
248 - 249	7	81	66
246 - 247	9	74	59
244 - 245	8	65	52
242 - 243	10	57	44
240 - 241	10	47	36
238 - 239	11	37	27
236 - 237	9	26	18
234 - 235	3	17	13
232 - 233	6	14	9
230 - 231	3	8	6
228 - 229	2	5	3
226 - 227	0	3	2
224 - 225	3	3	1

$M = 246.16$

Sum $X = 9,574$

Sum $X^2 = 2,354,702$

Table 24: Frequency Distribution of SCAT, Level 5, Form B (Oral), Quantitative, Converted Scores for Braille Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
286 - 287	1	117	99
284 - 285	0	116	99
282 - 283	0	116	99
280 - 281	1	116	99
278 - 279	1	115	98
276 - 277	3	114	96
274 - 275	2	111	94
272 - 273	1	109	93
270 - 271	5	108	90
268 - 269	6	103	85
266 - 267	0	97	83
264 - 265	5	97	81
262 - 263	1	92	78
260 - 261	4	91	76
258 - 259	3	87	73
256 - 257	10	84	68
254 - 255	0	74	63
252 - 253	10	74	59
250 - 251	4	64	53
248 - 249	16	60	44
246 - 247	9	44	34
244 - 245	10	35	26
242 - 243	5	25	19
240 - 241	5	20	15
238 - 239	4	15	11
236 - 237	11	11	5

M = 253.93

Sum X = 9,855

Sum X^2 = 2,462,245

Table 25: Frequency Distribution of SCAT, Level 5, Form B (Oral), Total Converted Scores for Braille Readers.

Score Group (X)	Frequency	Cumulative Frequency	Percentile Rank
278 - 279	1	117	99
276 - 277	1	116	99
274 - 275	1	115	98
272 - 273	1	114	97
270 - 271	4	113	95
268 - 269	2	109	92
266 - 267	3	107	90
264 - 265	5	104	87
262 - 263	2	99	84
260 - 261	5	97	81
258 - 259	6	92	76
256 - 257	8	86	70
254 - 255	8	78	63
252 - 253	8	70	56
250 - 251	15	62	46
248 - 249	18	47	32
246 - 247	11	29	20
244 - 245	8	18	12
242 - 243	3	10	7
240 - 241	7	7	3

M = 254.06

Sum X = 9,876

Sum X^2 = 2,509,966

APPENDIX C

Table 26: Distribution of SCAT, Level 5, Form A (Written), Verbal Converted Scores and Respective WISC Scores by Student for Combined Grades 4, 5, and 6 for Large Type Readers.

Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)
1	241	94	29	243	99
2	224	58	30	243	79
3	243	86	31	249	121
4	241	81	32	239	80
5	233	75	33	230	73
6	235	85	34	232	76
7	240	101	35	241	100
8	245	77	36	247	87
9	230	96	37	260	90
10	241	75	38	239	82
11	239	107	39	264	95
12	233	81	40	260	108
13	232	79	41	262	104
14	245	109	42	240	96
15	233	91	43	224	86
16	235	87	44	251	108
17	231	94	45	233	88
18	236	97	46	258	97
19	239	85	47	258	97
20	244	91	48	233	86
21	241	99	49	251	90
22	246	91	50	260	110
23	235	91	51	233	87
24	231	72	52	225	65
25	247	92	53	247	80
26	239	97	54	270	99
27	264	126	55	252	73
28	246	96	56	239	88
			57	233	108

Sum X = 13,805 Sum Y = 5,165

Sum X^2 = 3,350,035 Sum Y^2 = 477,475

Sum XY = 1,255,170

N = 57

Table 27: Distribution of SCAT, Level 5, Form A (Written), Quantitative Verbal Converted Scores and Respective WISC Scores by Student for Combined Grades 4, 5, and 6 for Large Type Readers.

Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)
1	244	94	29	256	99
2	237	58	30	265	79
3	242	86	31	263	121
4	243	81	32	261	80
5	245	75	33	245	73
6	240	85	34	256	76
7	250	101	35	255	100
8	245	77	36	256	87
9	238	96	37	260	90
10	237	75	38	266	82
11	250	107	39	255	95
12	256	81	40	270	108
13	244	79	41	272	104
14	252	109	42	263	96
15	246	91	43	241	86
16	248	87	44	272	108
17	238	94	45	237	88
18	242	97	46	276	97
19	249	85	47	282	97
20	272	91	48	261	86
21	257	99	49	275	90
22	263	91	50	288	110
23	254	91	51	251	87
24	252	72	52	237	65
25	272	92	53	257	80
26	265	97	54	260	99
27	272	126	55	240	73
28	261	96	56	263	88
			57	257	108

Sum X = 14,554 Sum Y = 5,165

Sum X^2 = 3,724,990 Sum Y^2 = 477,475

Sum XY = 1,323,486

N = 57

Table 28: Distribution of SCAT, Level 5, Form B (Oral), Verbal Converted Scores and Respective WISC Scores by Student for Combined Grades 4, 5, and 6 for Large Type Readers.

Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)
1	246	94	29	243	99
2	231	58	30	241	79
3	246	86	31	249	121
4	235	81	32	243	80
5	231	75	33	232	73
6	243	85	34	236	76
7	234	101	35	242	100
8	240	77	36	239	87
9	246	96	37	247	90
10	240	75	38	246	82
11	240	107	39	264	95
12	236	81	40	257	108
13	229	79	41	243	104
14	247	109	42	246	96
15	238	91	43	241	86
16	240	87	44	249	108
17	240	94	45	259	88
18	238	97	46	264	97
19	234	85	47	269	97
20	248	91	48	246	86
21	246	99	49	259	90
22	243	91	50	255	110
23	239	91	51	239	87
24	229	72	52	234	65
25	240	92	53	249	80
26	242	97	54	277	99
27	252	126	55	242	73
28	251	96	56	240	88
			57	255	108

Sum X = 13,930 Sum Y = 5,165

Sum X^2 = 3,409,648 Sum Y^2 = 477,475

Sum XY = 1,265,936

N = 57

Table 29: Distribution of SCAT, Level 5, Form B (Oral), Quantitative Converted Scores and Respective WISC Scores by Student for Combined Grades 4, 5, and 6 for Large Type Readers.

Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)
1	254	94	29	247	99
2	247	58	30	252	79
3	248	86	31	268	121
4	247	81	32	272	80
5	245	75	33	247	73
6	241	85	34	255	76
7	244	101	35	249	100
8	246	77	36	250	87
9	251	96	37	254	90
10	243	75	38	265	82
11	256	107	39	259	95
12	249	81	40	266	108
13	246	79	41	247	104
14	253	109	42	272	96
15	256	91	43	261	86
16	251	87	44	274	108
17	249	94	45	261	88
18	245	97	46	279	97
19	237	85	47	281	97
20	269	91	48	266	86
21	259	99	49	268	90
22	265	91	50	266	110
23	281	91	51	252	87
24	248	72	52	238	65
25	260	92	53	266	80
26	256	97	54	258	99
27	271	126	55	240	73
28	253	96	56	262	88
			57	268	108

Sum X = 14,613 Sum Y = 5,165

Sum X^2 = 3,753,177 Sum Y^2 = 477,475

Sum XY = 1,327,824

N = 57

Figure 30: Distribution of SCAT, Level 5, Form A (Written), Verbal Converted Scores and Respective WISC Scores by Student for Combined Grades 4, 5, and 6 for Braille Readers.

Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)
1	234	90	32	237	100	63	239	87
2	234	103	33	236	89	64	256	112
3	233	110	34	241	98	65	252	111
4	235	80	35	258	84	66	247	91
5	239	86	36	241	133	67	237	85
6	232	116	37	246	116	68	247	96
7	242	90	38	240	97	69	238	120
8	231	72	39	245	125	70	267	105
9	236	88	40	236	89	71	234	100
10	233	78	41	242	118	72	264	110
11	236	101	42	242	80	73	237	77
12	247	124	43	224	63	74	244	101
13	225	80	44	274	77	75	243	81
14	262	97	45	234	91	76	246	87
15	243	91	46	236	82	77	258	97
16	237	130	47	248	92	78	264	101
17	236	103	48	233	74	79	256	118
18	236	94	49	233	94	80	240	112
19	232	84	50	238	92	81	270	107
20	247	134	51	237	101	82	252	112
21	242	104	52	239	72	83	267	113
22	238	106	53	250	105	84	260	109
23	250	151	54	243	90	85	247	82
24	244	133	55	252	87	86	251	103
25	243	84	56	242	74	87	248	101
26	235	78	57	258	114	88	233	80
27	233	101	58	256	128	89	258	119
28	251	103	59	251	91	90	245	94
29	235	76	60	256	92	91	262	92
30	224	77	61	270	116	92	252	103
31	235	122	62	244	89			

Sum X = 22,476 Sum Y = 9,045

Sum X^2 = 5,501,930 Sum Y^2 = 915,149

Sum XY = 2,215,395

N = 92

Table 31: Distribution of SCAT, Level 5, Form A (Written), Quantitative Converted Scores and Respective WISC Scores by Student for Combined Grades 4, 5, and 6 for Braille Readers.

Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)
1	241	90	32	242	100	63	237	87
2	241	103	33	249	89	64	262	112
3	237	110	34	244	98	65	255	111
4	238	80	35	250	84	66	262	91
5	237	86	36	237	133	67	237	85
6	237	116	37	246	116	68	258	96
7	242	90	38	238	97	69	248	120
8	237	72	39	247	125	70	261	105
9	237	88	40	244	89	71	258	100
10	238	78	41	238	118	72	260	110
11	237	101	42	247	80	73	243	77
12	248	124	43	237	63	74	270	101
13	240	80	44	267	77	75	244	81
14	263	97	45	237	91	76	256	87
15	256	91	46	242	82	77	262	97
16	251	130	47	254	92	78	284	101
17	237	103	48	237	74	79	260	118
18	237	94	49	237	94	80	248	112
19	237	84	50	242	92	81	276	107
20	245	134	51	247	101	82	256	112
21	241	104	52	248	72	83	269	113
22	237	106	53	256	105	84	276	109
23	237	151	54	238	90	85	251	82
24	241	133	55	253	87	86	261	103
25	240	84	56	249	74	87	258	101
26	237	78	57	261	114	88	242	80
27	249	101	58	255	128	89	258	119
28	238	103	59	243	91	90	257	94
29	237	76	60	254	92	91	258	92
30	240	77	61	266	116	92	261	103
31	243	122	62	251	89			

Sum X = 22,860 Sum Y = 9,045

Sum X^2 = 5,691,236 Sum Y^2 = 915,149

Sum XY = 2,251,003

N = 92

Table 32: Distribution of SCAT, Level 5, Form B (Oral), Verbal Converted Scores and Respective WISC Scores by Student for Combined Grades 4, 5, and 6 for Braille Readers.

Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)
1	245	90	32	240	100	63	233	87
2	242	103	33	245	89	64	259	112
3	246	110	34	225	98	65	255	111
4	240	80	35	249	84	66	252	91
5	237	86	36	240	133	67	245	85
6	239	116	37	259	116	68	264	96
7	245	90	38	236	97	69	261	120
8	225	72	39	248	125	70	255	105
9	241	88	40	235	89	71	238	100
10	242	78	41	254	118	72	254	110
11	237	101	42	242	80	73	236	77
12	244	124	43	236	63	74	255	101
13	238	80	44	273	77	75	239	81
14	273	97	45	233	91	76	248	87
15	239	91	46	230	82	77	255	97
16	240	130	47	251	92	78	264	101
17	239	103	48	251	74	79	257	118
18	231	94	49	228	64	80	249	112
19	232	84	50	235	92	81	264	107
20	252	134	51	251	101	82	257	112
21	249	104	52	228	72	83	269	113
22	234	106	53	248	105	84	261	109
23	246	151	54	248	99	85	244	82
24	254	133	55	244	87	86	243	103
25	243	84	56	244	74	87	252	101
26	236	78	57	242	114	88	257	60
27	240	101	58	261	128	89	246	119
28	264	103	59	246	91	90	252	94
29	233	76	60	252	92	91	259	92
30	233	77	61	240	116	92	267	103
31	246	122	62	241	89			

Sum X = 22,632 Sum Y = 9,045

Sum X^2 = 5,578,042 Sum Y^2 = 915,149

Sum XY = 2,231,094

N = 92

Table 33: Distribution of SCAT, Level 5, Form B (Oral), Quantitative Converted Scores and Respective WISC Scores by Student for Combined Grades 4, 5, and 6 for Braille Readers.

Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)	Student Number	SCAT Scores (X)	WISC Scores (Y)
1	245	90	32	248	100	63	241	87
2	243	103	33	261	89	64	271	112
3	250	110	34	237	98	65	262	111
4	253	80	35	247	84	66	257	91
5	238	86	36	244	133	67	240	85
6	237	116	37	252	116	68	268	96
7	248	90	38	244	97	69	256	120
8	244	72	39	260	125	70	258	105
9	238	88	40	243	89	71	253	100
10	236	78	41	246	118	72	271	110
11	248	101	42	241	80	73	241	77
12	251	124	43	237	63	74	277	101
13	249	80	44	277	77	75	248	81
14	256	97	45	249	91	76	258	87
15	257	91	46	246	82	77	258	97
16	246	130	47	264	92	78	281	101
17	249	103	48	244	74	79	256	118
18	248	94	49	236	94	80	257	112
19	237	84	50	247	92	81	287	107
20	248	134	51	252	101	82	265	112
21	246	104	52	244	72	83	269	113
22	244	106	53	253	105	84	277	109
23	237	151	54	248	90	85	268	82
24	256	133	55	256	87	86	242	103
25	260	84	56	269	74	87	276	101
26	237	78	57	252	114	88	238	80
27	252	101	58	257	128	89	271	119
28	246	103	59	249	91	90	275	94
29	237	76	60	252	92	91	265	92
30	237	77	61	250	116	92	271	103
31	244	122	62	252	89			

Sum X = 23,242 Sum Y = 9,045

Sum X^2 = 5,884,488 Sum Y^2 = 915,149

Sum XY = 2,288,025

N = 92